Effectiveness of the Strengthening Diabetes Care Program: A Randomized Controlled Trial with Thai Nurse Practitioners

Sarinyaporn Phuangngoenmak, Wonpen Keawpan*, Panan Pichayapinyo, Uriwan Hangwong

Abstract : This randomized control trial examined the effects of a strengthening diabetes care program among Thai nurse practitioners working in a diabetic clinic at primary care units in a province in northern Thailand. The program was developed in three stages: 1) Self-administered questionnaires for analysis of the nurse practitioners' competency in diabetes care management 2) Development of program contents to strengthen their competencies with five modules for classroom training and three modules for e-learning program, and 3) A 4-week intervention, which comprised four consecutive days for classroom training and three weeks for an e-learning program. The program was evaluated three times: pre-intervention and weeks 4 and 8 post-intervention. Sixty NPs were randomly assigned into experimental group (n=30) and control group (n=30). Data were collected with five self-administered questionnaires on demographic data form, perceived self-efficacy, outcome expectancy, knowledge, and care skills in diabetes care, and analyzed by using descriptive statistics, Repeated Measures ANOVA and Independent t-test.

The findings revealed significant increases in mean scores of the experimental group on perceived self-efficacy, outcome expectancy, knowledge and skills in diabetes care higher than the control group at weeks 4 and 8 post-intervention. Based on the findings, the diabetes program can be used to strengthen nurse practitioners'competencies to build their confidence in diabetes care at primary care units with short course training and a subsequent e-learning program suitable for self-directed learning. Supervision should be monitored to help nurse practitioners in effective job performance.

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Introduction

Diabetes mellitus (DM) is a major non-communicable disease leading to public health issues, clinical problems and economic burdens in Thailand.[1-3] Nurse practitioners (NPs) working at primary care

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units (PCUs) play key roles in case management for people with diabetes, particularly those living in communities.[4,5] The roles of NPs including diabetes diagnosis, basic treatment under the supervision of a physician and the laws of the Thailand Nursing and Midwifery Council (TNMC), counseling, health promotion, home visits, referrals, and education in the diabetes mellitus (DM) clinic, but also visiting people with adverse complications including nephropathy, neuropathy and retinopathy at their homes, if needed.[4-6] However, the number of NPs is insufficient when compared to the number of people with diabetes living in communities, and this number rises every year.[6,7] In Thailand, the current population is 62 million; 1.8 million are expected to have DM during their lifetimes.[3] Approximately 90% of people with diabetes have type 2 DM, which is similar to the world prevalence.[1,2]

A province in the north of Thailand was chosen for this study since it has the highest prevalence of diabetes of 31,267 people, with a ratio of 1,801 persons with diabetes per 10,000 population.[8] This province has established DM clinics to provide care and support the NPs working at PCUs and DM clinics. Moreover, NPs' competencies are insufficient in treatment, complications assessment, interpretation of laboratory test results, case management, foot care, innovation, and research application to practice in care management for persons with diabetes.[9,10]

In order to support the Thai national policy on universal health care coverage at the primary care level, the TNMC envisions that nurses should be at the frontier in providing primary care to people with chronic conditions. Therefore, the TNMC and many schools of nursing have launched 4-month nursing training programs to increase competency in NPs who generally work in the community as primary care providers.[4] In general, the content is composed of advanced health assessment, primary medical and emergency care, leadership management, and health system policy. Noticeably, chronic disease, particularly DM care and management, are only one topic in the primary medical care course.[11] A review of studies in Thailand and developed countries, has revealed that most NPs do not feel confident in their abilities to take care of those with diabetes in the community and need to gain more training in DM management.[9,10,12-17] Therefore, strengthening DM care management programs for NPs is necessary, particularly for those who work in remote areas. This study tested the effectiveness of a strengthening diabetes care program (SDCP) based on self-efficacy theory for the development of a DM care program for Thai NPs at primary care units. The activities consisted of four consecutive days of training sessions and three weeks for self-study with an e-learning program that had not yet been integrated in DM care programs and had new challenges for nurse educators.[18,19]

Literature Review and Conceptual Framework

In Thailand, the roles of NPs were established in response to a physician shortage in primary care units. The National Health Security Office (NHSO) and TNMC promptly responded to health care reform in 2002 by carrying out strategies to assure health policy makers that nurses are the appropriate health care providers at the primary care level.[4] The major role of NPs is to provide integrative care which includes health promotion, prevention, and cure of minor or common local health problems in addition to rehabilitation services for people near their homes and care for people at the end of their life.[4,5] The TNMC took the lead in responding to this need.

Self-efficacy has been successfully used as a framework for increasing people's confidence in performing a specific behavior; the stronger an individual's belief in their abilities to perform a course of action, and in the positive outcomes of that action, the more likely they will initiate and persist in a given activity. Then, they infer their capabilities

from the imagined outcomes which precede the actions.[20] This is called self-efficacy, the theory of which was used as the conceptual framework in developing programs to improve knowledge, skills and self-efficacy in the job performance and care provided by NPs.[21-28] Strategies included four principal sources of information composed of enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states.[20] A review of studies, in Thailand and developed countries, revealed that most interventions for developing programs used four principal sources of information (direct experience, reflection, observation, role play, and online instruction). Furthermore, the results revealed significant differences in knowledge, skills and self-efficacy achieved after receiving a variety of interventions.[21-28]

The SCPD program was developed based on NPs' competency in DM care management, a literature review and self-efficacy theory. The process of program development involved five steps based on the following curriculum development of Uys & Gwele[29]: 1) establish the context and foundations; 2) formulate the outcomes or objectives; 3) select a curriculum model and develop a macro-curriculum; 4) develop the micro-curriculum; and 5) plan for the evaluation of implementation and outcomes. The activities were composed of training and an e-learning program. The training methods included instruction, case studies, group discussion, demonstration and practical skills, and experience sharing with a live model and reinforcement by offering praise and encouragement via living models. Moreover, this program included an e-learning program as an appropriate learning method with support for concepts known as life-long learning, anywhere-anytime learning, greater efficiency in accumulating knowledge, and building cognitive skills in an environment where everyone can learn at their own place and take their time to learn what they need to know.[30,31] In addition, the e-learning program offer new challenges for nurse educators.[18,19] NPs who work in remote areas can study by self-directed learning at their own place for reviewing knowledge about DM care. Previous e-learning programs had not been integrated in DM care programs, and thus the SDCP in this study was designed to be suitable for NPs working in remote areas to help bridge the gap in DM care at primary care units. In summary, the literature review was synthesized into a conceptual framework as shown in **Figure 1**.
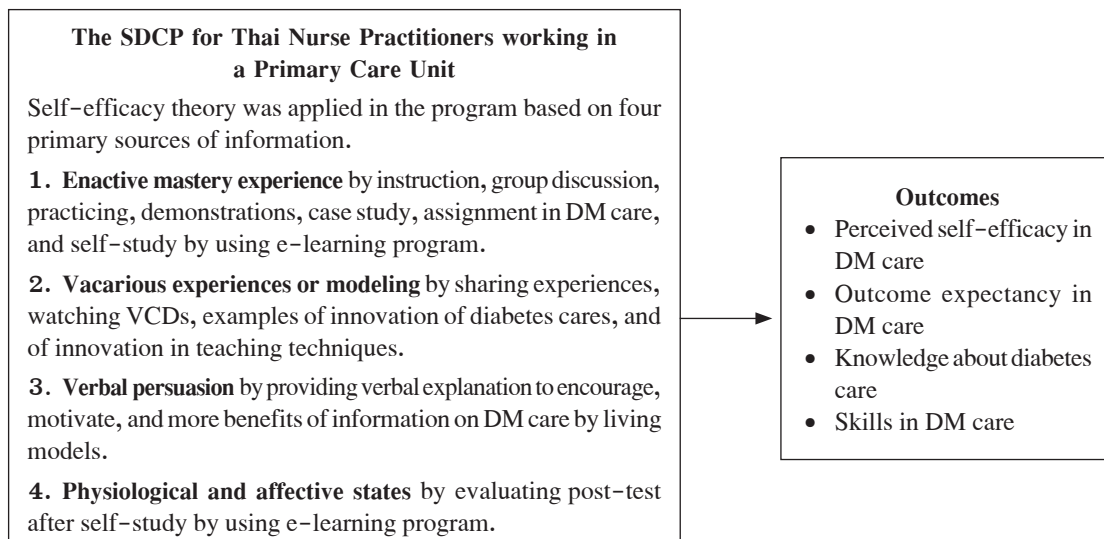

The SDCP for Thai Nurse Practitioners working in a Primary Care Unit

Self-efficacy theory was applied in the program based on four primary sources of information.

1. Enactive mastery experience by instruction, group discussion, practicing, demonstrations, case study, assignment in DM care, and self-study by using e-learning program.

2. Vacarious experiences or modeling by sharing experiences, watching VCDs, examples of innovation of diabetes cares, and of innovation in teaching techniques.

3. Verbal persuasion by providing verbal explanation to encourage, motivate, and more benefits of information on DM care by living models.

4. Physiological and affective states by evaluating post-test after self-study by using e-learning program.

Outcomes
- Perceived self-efficacy in DM care
- Outcome expectancy in DM care
- Knowledge about diabetes care
- Skills in DM care

Figure 1. Conceptual Framework of this Study

Hypothesis

After finishing the program, NPs in the experimental group would have significantly higher mean scores on perceived self-efficacy, outcome expectancy, knowledge about diabetes, skills in DM care than that at the beginning of the program, and higher than that of control group at the fourth and eighth weeks after intervention.

Method

Design: A randomized control trial.

Sample and Setting: The population consisted of NPs who had responsibility in DM clinics at primary care units in northern Thailand from November 2014 to February 2015. They were recruited if they met the following inclusion criteria: 1) had worked full-time in a DM clinic at a PCU for at least one year; and 2) were computer literate. The exclusion criteria were those who worked part-time in DM clinics, or were unable to participate in all processes.

The sample size calculation of Polit & Beck[32] using power analysis was employed to reduce the risk of type II error. The minimum level of significance (α) to estimate the number of sample size was .05 with the power of .80 (1–ß), a medium effect size, which would yield a total sample size of n= 50 (n=25 per condition, for a total of two conditions). Anticipating potential bias due to dropouts and the desire to prevent possible low power to detect small differences, the principal investigator (PI) recruited 25% additional participants which added seven more participants in each group for a total sample size of n=64 (n=32 per condition).

The PI screened an initial sample of NPs who presented at 272 PCUs. A total of 215 eligible participants were initially approached; 135 did not meet the criteria and 17 were unable to participate in all processes of this study. Therefore, 64 participants were randomly assigned either to the experimental or the control group using simple random sampling. During the study period, 4 participants discontinued the study. In the experimental group, 2 participants were not able to participate in classroom training and 2 participants in control group had moved out of the area during data collection. The final number of participants used for data analyses were 30 in both groups (**Figure 2**).
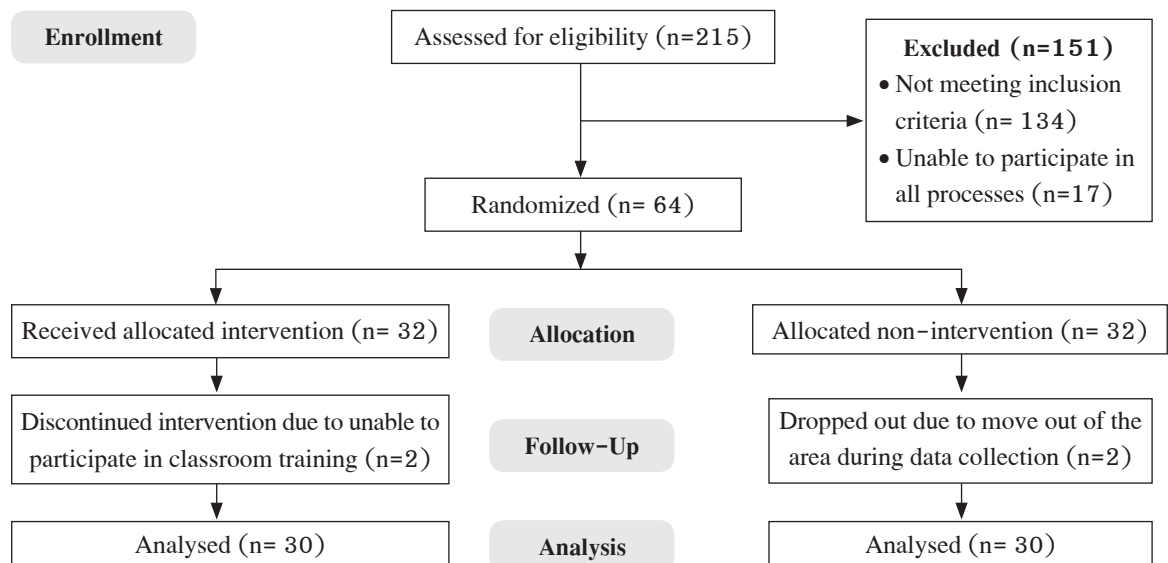

Figure 2. Flow diagram of participants in randomized controlled trial

Ethical Considerations: This study was granted approval by the Research Ethics Committee of the Faculty of Public Health, Mahidol University (MUPH 2013-134) prior to data collection. All NPs who met the inclusion criteria were provided detailed information regarding the research objectives, intervention and preservation of confidentiality and anonymity. Next, all of the participants signed a written informed consent form as a voluntary agreement to participate in the research. The participants' rights were protected throughout the study. The control group who did not receive this intervention was allowed to take the same program as those in the experimental group after the experiment if they wanted to.

Instruments: Five instruments in this study were developed by PI and examined for content validity by five experts (two public health nurse instructors, one educational administration instructor, one instructor in the curriculum for NPs related to primary medical care and one public health instructor) using the content validity index (CVI) between 0.8 and 1.0. The internal consistency reliability was tested with 30 participants, who met the same inclusion criteria as the study participants. Perceived self-efficacy, outcome expectancy, and skills in DM care questionnaires were developed based on the literature reviews of self-efficacy theory and five domains of core competencies of NPs released by the Thailand Nursing and Midwifery Council.[33] Knowledge about diabetes care was developed based on a handbook and clinical practice guideline for diabetes from the Diabetes Association of Thailand, The Endocrine Society of Thailand, Department of Medical Services, National Health Security Office, and American Diabetes Association.[34,35] All questionnaires were described below:

A demographic questionnaire collected data on age, gender, marital status, educational level, duration after completing short course, Program of Nursing Specialty in Nurse Practitioner (Primary Medical Care), and work experience in DM clinic at primary care unit.

Perceived Self-efficacy in DM Care was used to evaluate the NPs' confidence in performing DM care at PCUs. The questionnaire contains 20 items with 5-point Likert scales. The scores range from 0 (definitely not confident) to 4 (definitely confident) with total scores ranging from 0 to 80 points. Higher scores indicate higher confidence in performing DM care at PCU. Examples of items are: "You can assess the risk for diabetes and interpret the risk score" and "You can conduct screening and diagnosis in diabetes patients". In this study, the Cronbach's alpha was 0.87.

Outcome Expectancy in DM Care was used to evaluate the outcome expectations in NP performance in DM care at PCUs. The questionnaire contains 15 items with 5-point Likert scales. The scores range from 0 (totally disagree) to 4 (totally agree), with total scores ranging from 0 to 60 in which higher scores indicate higher outcome expectations for performing DM care at PCUs. Examples of items are: "If I practice early diagnosis in diabetes patients, the complications of the disease can be prevented" and "If I use innovations in DM care, complications can be reduced ". In this study, the Cronbach's alpha was 0.94.

Skills in DM Care was used to evaluate the NPs' skills in performing DM care at PCUs. The questionnaire contains 20 items with 5-point Likert scales. The scores range from 1 (very low) to 5 (very well) with total scores ranging from 1 to 100 in which higher scores indicate higher skills in performing DM care at PCUs. An example of items is: "You can assess the foot of person with diabetes by using Semmes-Weinstein monofilament test". In this study, the Cronbach's alpha was 0.93.

Knowledge about Diabetes Care was used to evaluate the NPs' knowledge in diabetes care at PCUs. The questionnaire consists of 20 items and a four-multiple choice test. Participants were required to respond to all of the items by selecting only one answer. The participants received 1 point for each correct answer. The scores range from 0 to 20 in which higher score indicates higher knowledge about diabetes care. An example of items is: "Based on the information of the case study, nurse practitioner can assess and interpret the risks of diabetes and advised in this case...?" In this study, the Kuder-Richardson Formula 20 was 0.80.

Intervention Program: This intervention was developed by the PI based on Uys and Gwele's curriculum development[29] and Bandura's self-efficacy theory[20]. The content validity of the program was reviewed by 5 experts (two public health nurse instructors, one educational administration instructor, one instructor in the curriculum for NPs related to primary medical care and one public health instructor), and revised according to their recommendation. It was pilot tested for understanding and program practicality with five NPs who met the inclusion criteria but did not participate in the main study.

The program has three phases. During Phase 1, the PI surveyed the perceived competency of 135 NPs in DM care management at a primary care unit in northern Thailand by self-administered questionnaires composed of the following five domains: (1) management of patient health/illness status; (2) NP-patient relationships; (3) Teaching-coaching functions; (4) professional roles; and (5) managing and negotiating the health care delivery system. The results indicated that overall NP competencies were moderate when considered individually; two domains, namely, NP-patient relationships and managing and negotiating health care delivery system had high levels of competency and three domains, namely, management of patient health/illness status, teaching-coaching functions and professional roles had moderate levels of competency. Moreover, the NPs were concerned about DM training and a general lack of DM knowledge in addition to low confidence in DM practice (e.g.,

clinical practice guidelines for DM, case management, communication skills and teaching techniques).

As shown in **Table 1,** the SDCP was conducted based on information from the previous phase by using Bandura's self-efficacy theory as a conceptual framework. The intervention was conducted between Weeks 1 to 4 to increase the level of perceived self-efficacy, outcome expectancy, knowledge and skills in DM care among NPs. The strategy was emphasized the four primary sources of information from Bandura's self-efficacy theory including: (1) enactive mastery experience; (2) vicarious experiences; (3) verbal persuasions and (4) physiological and affective states. At Week 1, the program was composed of four consecutive days for classroom training with five modules including the following: (1) diabetes and complications; (2) clinical practice guidelines for diabetes; (3) case management; (4) communication skills and (5) teaching techniques. The teaching methods included instruction, group discussion, practicing, demonstration, case study, assignment, sharing experiences with role models, watching VCD with examples of innovations in DM care, and teaching techniques as well as reinforcement by praise and encouragement with beneficial information via living models. For Weeks 2 to 4, the e-learning program was conducted with the following three modules: (1) Semmes-Weinstein monofilament test; (2) self-monitoring of blood glucose and (3) case management.   All teaching methods emphasized self-study, pre-test and post-test.

Table 1: Content and methods for the Strengthening Diabetes Care Program (SDCP).

Time Schedule	Competency domain	Module & contents	Strategies	Teaching Method
Week 1 (4 days) 6 hrs/day	MPI	**Classroom Instruction:** Module 1: Diabetes and complications Module 2: Clinical practice guidelines for diabetes - Medical regimen - Diagnosis, assessment, treatment, and prevention of hypo-and hyperglycemia in diabetic patients	Enactive mastery experience	1) Instruction 2) Group discussion 3) Practicing 4) Demonstrations 5) Case study 6) Assignment

Table 1: Content and methods for the Strengthening Diabetes Care Program (SDCP). (Cont.)

Time Schedule	Competency domain	Module & contents	Strategies	Teaching Method
		– Investigation of guidelines for DM complications – Practice guidelines for DM foot care	Vicarious experience	1) Sharing experiences 2) Watching VCDs 3) Examples of innovation of diabetes cares 4) Examples of innovation of teaching techniques
	PR&MNH NPR TCF	Module 3: Case management Module 4: Communication skills Module 5: Teaching techniques		
			Verbal persuasion	Provide appreciation and more benefit information

Week 2
(1 week/
Any time)
	MPI	**E-learning module education:**
		Module 1: Semmes-Weinstein monofilament test.
		  – Definition and benefits
		  – Techniques and method
			Enactive mastery experience	Self-study

			Physiological and affective states	Post-test feedback

Week 3
(1 week/
Any time)
	TCF	**E-learning module education:**
		Module 2: Self-monitoring of blood glucose (SMBG)
		  – Definition and benefits of SMBG.
		  – Indication of SMBG
		  – How to use the SMGB in patients with diabetic
			Enactive mastery experience	Self-study

			Physiological and affective states	Post-test feedback

Week 4
(1 week/
Any time)
	PR&MNH	**E-learning module education :**
		Module 3: Case management
		  – Definition of case management
		  – Role of nurse case management in DM care
		  – Case management in diabetic patients:
		  – High risk cases
		  – Diabetic cases
		  – Complication cases
			Enactive mastery experience	Self-study

			Physiological and affective states	Post-test feedback

Note: MPI = management of patients' health/illness status; NPR= Nurse practitioner– patient relationship; TCF = teaching –coaching function; PR= professional roles; MNH= managing and negotiating health care system

Data collection: Participants who met the inclusion criteria were approached, and informed the purpose of study. After obtaining informed consent, they were asked to complete the self-administered questionnaires. The experimental group received a 4-week intervention composed of four consecutive days for classroom training and three weeks for the e-learning program, whereas the control group did not receive any intervention. Data were collected at the beginning, Weeks 4 and 8.

Data Analysis: Statistical analyses employed SPSS 18.0 statistical package for Windows (Bangkok, Thailand). Descriptive statistics including percentage, mean, and standard deviation, were used to describe the participants' characteristics. Repeated Measures ANOVA and Independent *t*-test were used to evaluate the differences in mean score of the data between the experimental and control groups at baseline and at Weeks 4 and 8 post-intervention. All statistical significance was defined as $p < .05$.

Results

Totally, 60 nurses completed the program with 30 in the experimental group and 30 in the control group. As shown in **Table 2**, the mean age of experimental and control groups was 43 (SD = 7.6) and 46 (SD = 7.6) years old, respectively. The majority of participants in both groups were married female and almost all held a bachelor degree. The average years since short course training as NP was 3.69 years (SD = 2.7) for the experimental group, and 5.38 years (SD = 3.4) for the control group. The mean work experience in a DM clinic in primary care unit for experimental and control groups were 6.2 (SD = 4.4) and 9.4 (SD = 6.97) years, respectively. There were no significant differences between the groups with regard to age, duration after complete the short course and work experience in DM clinics as presented, whereas gender, marital status and education level were significantly different.

Table 2 Socio-demographic characteristics of the experimental and control groups.

Characteristic	Experimental group (n= 30)	Control group (n=30)	*p-value*
Age (years), mean (SD)	42.6 (7.6)	45.7 (7.6)	0.066 [b]
Gender, N (%)			
Male	–	1 (3.3)	0.000 [*a]
Female	30 (100)	29 (96.7)	
Marital status, N (%)			
Single	4 (13.3)	1 (3.3)	0.000*[a]
Married	24 (80.0)	23 (76.7)	
Separate	2 (6.7)	6 (20.0)	
Education level, N (%)			
Bachelor degree	28 (93.3)	22 (73.3)	0.000 [*a]
Master degree	2 (6.7)	8 (26.7)	
Duration after complete short course (years), mean (SD)	3.69 (2.7)	5.38 (3.4)	0.823 [b]
Work experience in DM clinics (years), mean (SD)	6.23 (4.4)	9.43 (6.9)	0.106 [b]

Note: * $p < .05$; a = Chi-Square test ; b = Independent *t*-test

When performing Repeated Measures Two-Way ANOVA, the mean scores for perceived self-efficacy, outcome expectancy, knowledge and skills in DM care showed significant differences between the experimental and control groups (F test = 94.88, 31.91, 24.97 and 10.16, respectively) (p < .001) **(Table 3)**.

Findings from the independent *t*-test data analysis at baseline showed that there were no differences in perceived self-efficacy, outcome expectancy, knowledge and skills in DM care between experimental and control groups (p = 0.065, 0.216, 0.179, and 0.218, respectively). At Week 4, the mean scores of all variables in the experimental group were significantly higher than the control group (p = 0.007, 0.001, 0.005, and 0.005, respectively). Also at Week 8, the mean scores of all variables in the experimental group were significantly higher than the control group (p = 0.002, 0.001, 0.001 and 0.005, respectively) **(Table 4)**.

Table 3 Mean Scores Difference, Across Time, between and within groups.

Source of variables	SS	df	MS	F	p-value
Perceived self- efficacy in DM care [b]					
Between groups					
Groups	4784.36	1	4784.36	94.88	< 0.001**
Between groups error	2924.76	58	50.43		
Within groups					
Time	2887.34	1.00	2878.93	33.87	< 0.001**
Group * Time	1194.74	1.00	1191.26	14.01	< 0.001**
Within groups error	4944.58	58.17	85.00		
Outcome expectancy in DM care [b]					
Between groups					
Groups	1301.42	1	1301.42	31.91	< 0.001**
Between groups error	2365.16	58	40.78		
Within groups					
Time	524.41	1.02	513.71	18.89	< 0.001**
Group * Time	724.34	1.02	709.56	26.09	< 0.001**
Within groups error	1609.91	59.21	27.19		
Knowledge in diabetes care [c]					
Between groups					
Groups	355.61	1	355.61	24.97	< 0.001**
Between groups error	826.01	58	14.24		
Within groups					
Time	455.70	2	227.85	89.83	< 0.001**
Group * Time	403.41	2	201.71	79.54	< 0.001**
Within groups error	294.22	116	2.51		
Skills in diabetes care [b]					
Between groups					
Groups	2486.45	1	2486.45	10.16	0.002*
Between groups error	14192.28	58	244.69		
Within groups					
Time	3974.58	1.48	2680.90	18.82	< 0.001**
Group * Time	1153.60	1.48	778.12	5.46	0.011*
Within groups error	12247.16	85.99	142.43		

Note : [a] = Two- way repeated measure ANOVA; [b] = Greenhouse-Gesser ; [c] = Sphericity Assumed ;
    * p < .05; **p < .001

Table 4 The difference of outcomes between experimental and control groups

Data	Mean（SD）		p-value
	Experimental group	**Control group**	
Perceived self-efficacy			
Baseline	57.96（6.4）	54.93（11.2）	0.065
Week 4	71.60（3.6）	57.96（6.4）	0.007*
Week 8	72.23（3.2）	57.96（6.4）	0.002*
Week 4 – baseline	13.63（7.4）	3.03（14.2）	0.001*
Week 8 – baseline	14.26（7.1）	3.03（14.2）	0.001*
Outcome expectancy			
Baseline	47.10（4.7）	47.36（5.5）	0.216
Week 4	54.80（4.8）	47.10（4.7）	0.001*
Week 8	55.10（4.6）	46.40（4.4）	0.001*
Week 4 – baseline	7.70（5.0）	−0.26（7.8）	0.009*
Week 8 – baseline	8.00（4.9）	−0.96（7.4）	0.012*
Knowledge			
Baseline	8.36（1.9）	9.76（2.9）	0.179
Week 4	14.73（1.5）	10.20（3.5）	0.005*
Week 8	15.06（1.5）	9.76（3.0）	0.001*
Week 4 – baseline	6.36（2.1）	0.43（1.9）	0.005*
Week 8 – baseline	6.70（2.2）	0.00（2.6）	0.018*
Skills			
Baseline	68.96（9.9）	68.60（20.9）	0.218
Week 4	83.63（4.2）	73.66（13.7）	0.005*
Week 8	84.83（3.9）	72.86（12.3）	0.005*
Week 4 – baseline	14.66（11.7）	5.06（20.8）	0.002*
Week 8 – baseline	15.86（11.3）	4.26（19.8）	0.011*

Note: Independent *t*-test.

* p < .05

Discussion

The findings showed the effectiveness of the program in strengthening competency in diabetes care among NPs. In the experiment group, this program significantly increased perceived self-efficacy, outcome expectancy, knowledge and skills in DM care at Weeks 4 and 8, compare to the baseline. In addition, when compared to the control group, the levels of perceived self-efficacy, outcome expectancy, knowledge and skills in DM care were statistically and significantly higher at Weeks 4 and 8. Therefore, the results confirm the effectiveness of the intervention of this program in enhancement of perceived self-efficacy, outcome expectancy, knowledge and skills by using the four strategies indicated by Bandura[20], namely, enactive mastery experience, vicarious experiences, verbal persuasion, and physiological and affective states. This finding is congruent with many studies in both Thailand and other countries revealing that four major sources of self-efficacy can increase knowledge, skills and self-efficacy in the job performance of nurses and health personnel.[21,25,36,37]

Interestingly, the intervention of this program was combined with an e-learning program. E-learning is a form of online learning that is a suitable method for continuing education, especially for individuals with a high degree of discipline in independent learning at remote locations based on personal needs and place.[30,31] This is also supported by a previous study that reported most public health nurses and health care professionals to believe that e-learning is beneficial for achieving life-long learning, fulfilling personal interests, offering time-saving, information diversity, flexibility in terms of time and space, self-regulatory learning and cost-effectiveness.[38] Moreover, e-learning can enhance learning, memory and practice due to repeatable contents.[39] Notably, since the e-learning program was made available on compact disks, participants could repeat material they required independently at their own place without a requirement for internet access. For the entire results of the evaluation, participants were satisfied and interested in the e-learning program.

In summary, the experimental group performed all modules that helped increase perceived self-efficacy, outcome expectancy, knowledge and skills in the DM care of NPs working in DM clinics at primary care units. Therefore, the SDCP for NPs may bridge the gap in diabetes care at primary care units. In the future, the effects of the SDCP should be investigated for long-term sustainability.

Limitations

When applying the research findings, limitations need to be taken into consideration for generalizability. First, participants were recruited from only primary care setting in one province of Thailand. Second, small numbers of participants in all groups were studied due to drop-outs during the intervention. Therefore, future studies need to consider the use of a larger number of primary care settings and larger sizes of participants located throughout the country.

Conclusion and Implications for Nursing Practice

The findings indicate that the SCDP is an effective program to strengthen the competencies of NPs to build confidence in DM care at primary care units. Therefore, the strengthening of NPs should be continued to build confidence in job performance at DM clinics. In the future, the effects of the SCDP should be integrated in the curriculum of the Program of Nursing Specialty in Nurse Practitioners (Primary Medical Care) in order to gain clinical expertise for DM and case management. In addition, public health administrators should support NPs to continuously acquire appropriate knowledge in DM care.

Acknowledgement

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ผลของโปรแกรมการเสริมสร้างสมรรถนะการดูแลผู้ป่วยโรคเบาหวาน การทดลองแบบสุ่มและมีกลุ่มควบคุมในพยาบาลเวชปฏิบัติ

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บทคัดย่อ: การวิจัยเชิงทดลองแบบสุ่มและมีกลุ่มควบคุมนี้ เพื่อทดสอบผลของโปรแกรมการเสริมสร้าง สมรรถนะการดูแลผู้ป่วยโรคเบาหวานของพยาบาลเวชปฏิบัติ ที่ปฏิบัติงานในการดูแลผู้ป่วยโรคเบาหวาน ณ หน่วยบริการปฐมภูมิ จังหวัดหนึ่งในภาคเหนือของประเทศไทย โดยมีขั้นตอนของการพัฒนาโปรแกรม 3 ขั้นตอน คือ 1) วิเคราะห์สมรรถนะในการจัดการดูแลผู้ป่วยโรคเบาหวานของพยาบาลเวชปฏิบัติ จาก แบบสอบถาม 2) พัฒนาเนื้อหาของโปรแกรมเพื่อเสริมสร้างสมรรถนะการดูแลผู้ป่วยโรคเบาหวาน ของพยาบาลเวชปฏิบัติประกอบด้วย 5 โมดูล สำหรับการฝึกอบรมเชิงปฏิบัติการในห้องเรียน และ 3 โมดูล สำหรับโปรแกรม e-learning 3) ดำเนินการทดลองโดยมีกิจกรรมทั้งหมด 4 สัปดาห์ สัปดาห์แรกเป็นการ ฝึกอบรมเชิงปฏิบัติการในห้องเรียนจำนวน 4 วันติดต่อกัน และอีก 3 สัปดาห์เป็นการศึกษาด้วยตนเอง โดยใช้โปรแกรม e-learning และมีการติดตามประเมินผลเข้าร่วมโปรแกรม 3 ครั้ง คือ ก่อนเข้าร่วมโปรแกรม หลังเสร็จสิ้นการเข้าร่วมโปรแกรมสัปดาห์ที่ 4 และสัปดาห์ที่ 8 กลุ่มตัวอย่าง คือ พยาบาลเวชปฏิบัติ จำนวน 60 คน ถูกสุ่มเข้ากลุ่มทดลอง (n=30) และกลุ่มควบคุม (n= 30) เก็บรวบรวมข้อมูลโดยแบบสอบถาม แบบตอบด้วยตนเอง จำนวน 5 ฉบับ ได้แก่ แบบสอบถามข้อมูลทั่วไป แบบสอบถามการรับรู้ความ สามารถของตนเองในการดูแลผู้ป่วยโรคเบาหวาน แบบสอบถามความคาดหวังในการดูแลผู้ป่วยโรค เบาหวาน แบบทดสอบความรู้ในการดูแลผู้ป่วยโรคเบาหวาน และแบบสอบถามทักษะในการดูแลผู้ป่วย โรคเบาหวาน วิเคราะห์ข้อมูลโดยใช้สถิติ Repeated Measures ANOVA and Independent t-test.

     ผลการวิจัยพบว่า กลุ่มทดลองมีคะแนนเฉลี่ยของการรับรู้ความสามารถของตนเองในการดูแล ผู้ป่วยโรคเบาหวาน ความคาดหวังในการดูแลผู้ป่วยโรคเบาหวาน ความรู้ในการดูแลผู้ป่วยโรคเบาหวานและ ทักษะในการดูแลผู้ป่วยโรคเบาหวานสูงกว่ากลุ่มควบคุม ณ สัปดาห์ที่ 4 และสัปดาห์ที่ 8 หลังการทดลอง

     ข้อเสนอแนะจากการวิจัย พบว่า โปรแกรมนี้ช่วยเสริมสร้างสมรรถนะและสร้างความมั่นใจใน การดูแลผู้ป่วยโรคเบาหวานของพยาบาลเวชปฏิบัติ ณ หน่วยบริการปฐมภูมิ ด้วยวิธีการจัดอบรมเชิง ปฏิบัติการระยะสั้นและใช้สื่อ e -learning ที่เหมาะสมสำหรับการเรียนรู้ด้วยตนเอง และควรมีการนิเทศ ติดตามการปฏิบัติงานอย่างต่อเนื่องเพื่อช่วยให้พยาบาลเวชปฏิบัติ ปฏิบัติงานได้อย่างมีประสิทธิภาพ

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